

CLAIMS

What is claimed is:

1. A method of making a semiconductor coated nanoparticle comprising a layer of at least one semiconducting material covering at least a portion of at least one surface of a nanoparticle,
5 comprising:
 - (A) dispersing the nanoparticle under suitable conditions to provide a dispersed nanoparticle; and
 - (B) depositing at least one semiconducting material under suitable conditions onto
10 at least one surface of the dispersed nanoparticle to produce the semiconductor coated nanoparticle.
2. The method of claim 1, wherein the nanoparticle substrate comprises a fullerene.
3. The method of claim 2, wherein the fullerene comprises at least one of C₆₀ molecules, C₇₂ molecules, C₈₄ molecules, C₉₆ molecules, C₁₀₈ molecules, C₁₂₀ molecules, ovoid molecules, single-walled carbon nanotubes, and multi-walled carbon nanotubes.
- 15 4. The method of claim 2, wherein the fullerene comprises a surface modified fullerene.
5. The method of claim 1, wherein the at least one surface of the dispersed nanoparticle is activated.
6. The method of claim 1, wherein the semiconducting material comprises at least one of photonic bandgap engineered materials; III-V and II-VI binary, ternary, and quaternary
20 compound semiconductors; metallic oxides; polymers; liquid crystals; and suitable organic compounds.
7. The method of claim 1, wherein the semiconducting material comprises at least one of ZnS, CdS, CdSe, GaAs, InP, GaS, TiO₂, and Fe₂S₃.
8. The method of claim 1, wherein the semiconducting material comprises at least one of
25 CdS and CdSe.
9. The method of claim 1, wherein the semiconducting material is capable of at least one of absorbing and emitting light.
10. The method of claim 1, wherein dispersing the nanoparticle is accomplished by chemical functionalization.
- 30 11. The method of claim 10, wherein chemical functionalization comprises hydroxylation.
12. The method of claim 1, wherein dispersing the nanoparticle is accomplished by surfactant addition.

13. The method of claim 12, wherein the surfactant comprises at least one of sodium dodecylsulfate, dodecyltrimethyl ammonium bromide, N-hexadecyl-N(2-hydroxy-ethyl)-N,N'-dimethylammonium bromide, sodium dodecyl(benzenesulfonate), and dodecyl(benzene) trimethylammonium halide.
- 5 14. The method of claim 1, wherein depositing of step (B) comprises contacting the at least one surface with a solution comprising precursors to the semiconducting material.
15. The method of claim 1, wherein step (B) further comprises adding at least one capping agent to the solution.
16. The method of claim 15, wherein the at least one capping agent comprises at least one
10 of n-tetradecylphosphonic acid, ethanol, and an organic thiol.
17. The method of claim 1, wherein step (B) further comprises catalyzed growth of the semiconducting material onto the at least one surface.
18. The method of claim 17, further comprising
(C) quenching the catalyzed growth.
- 15 19. The method of claim 1, further comprising
(C) inserting the semiconductor coated nanoparticle in vivo.
20. A semiconductor coated nanoparticle comprising:
a nanoparticle; and
a semiconductor coating, wherein the semiconductor coating coats at least a portion of
20 the nanoparticle.
21. The semiconductor coated nanoparticle of claim 20, wherein the nanoparticle comprises a fullerene.
22. The semiconductor coated nanoparticle of claim 21, wherein the fullerene comprises at least one of C₆₀ molecules, C₇₂ molecules, C₈₄ molecules, C₉₆ molecules, C₁₀₈ molecules, ovoid
25 molecules, C₁₂₀ molecules, single-walled carbon nanotubes, and multi-walled carbon nanotubes.
23. The semiconductor coated nanoparticle of claim 20, wherein the fullerene comprises a surface modified fullerene.
24. The semiconductor coated nanoparticle of claim 20, wherein the semiconductor coating
30 comprises at least one of photonic bandgap engineered materials; III-V and II-VI binary, ternary, and quaternary compound semiconductors; metallic oxides; polymers; liquid crystals; and suitable organic compounds.

25. The semiconductor coated nanoparticle of claim 20, wherein the semiconductor coating comprises at least one of ZnS, CdS, CdSe, GaAs, InP, GaS, TiO₂, and Fe₂S₃.
26. The semiconductor coated nanoparticle of claim 20, wherein the semiconductor coating comprises at least one of CdS and CdSe.
- 5 27. The semiconductor coated nanoparticle of claim 20, wherein the semiconductor coating is capable of at least one of absorbing and emitting light.